Conjunctivodacryocystorhinostomy: Indications, Techniques, and Complications

27

Mohammad Javed Ali

Introduction

Complete proximal bicanalicular obstructions remain one of the most intriguing lacrimal disorders posing a dilemma on both diagnostic and management fronts. Conjunctivodacryocystorhinostomy or CDCR was initially described by Von Hoffman in 1904 [1] and, later, with Jones tubes by Lester Jones in 1962 [2, 3]. In this procedure, a new passage is created for drainage of tears from the conjunctival cul-de-sac directly into the nasal cavity. The procedure can be performed via an external approach (external CDCR), an endoscopic approach (endoscopic CDCR), a minimally invasive approach (MICDCR), or an endoscopic conjunctivorhinostomy (CR) without a DCR. Though the procedure is useful with a success rate hovering around 90 %, large series have shown two major complications, namely extrusion of the tube ranging from 28 % to as high as 51 % and tube malpositions ranging from 22 to 28 % [4–7]. In order to avoid these complications numerous modifications of the bypass tube have been published including additional flanges, wide medial ends, angulated tubes, and porous polyethylene-coated tubes [8–11]. The complications though reduced still continue to be a matter of concern. Minimally invasive placement of Jones tubes without a DCR with and without the use of endoscopic guidance is gaining popularity in recent times [12–14]. Although most of the contraindications to CDCR are relative, careful patient selection is of utmost importance. The chapter will discuss indications, contraindications, techniques, complications, and outcomes of various approaches for CDCR.

Indications

1. Punctal agenesis
2. Canalicular agenesis
3. Proximal canalicular obstructions
4. Post-dacryocystectomy rehabilitation
5. Multiple times failed DCR with canalicular obstructions
6. Lacrimal pump failures
7. Unresolved epiphora following a patent DCR

Contraindications

1. Scarred medial canthus
2. Gross eyelid anomalies
3. Gross nasal deformities
4. Early childhood
5. Mentally unstable patients

M. Javed Ali, MS, FRCS, FRCGP
Dacryology Service, L.V. Prasad Eye Institute,
Banjara Hills, Hyderabad 500034, India
e-mail: drjaved007@gmail.com

M. Javed Ali (ed.), *Principles and Practice of Lacrimal Surgery*,
DOI 10.1007/978-81-322-2020-6_27, © Springer India 2015

6. Unrealistic expectations or patients not keen on tube maintenance
7. Poor systemic health
8. Patient who cannot come for follow-ups (relative)

Instruments and Setup

The standard Ophthalmic plastic instrument sets and operating room are adequate to perform a CDCR. To perform the endoscopy-assisted technique of CDCR, a nasal endoscope with viewing system should be available.

The ideal bypass tube is nonhydrophobic, nonreactive with the tissues, and rigid enough not to collapse. The original Jones tubes are a set of pyrex glass tubes of varying sizes; the usual lengths vary from 9 to 28 mm (Fig. 27.1) The ocular end has a flange with a diameter of 3, 3.5, or 4 mm. The nasal end has a gentle flange. The outer diameter of the tube is 2.5 mm, and the inner diameter is 1.5–1.7 mm. Straight tubes are more commonly used but curved tubes are also available. Flanges with holes have also been designed to secure the tube by passing suture through the holes. Gold-plated dilators (Fig. 27.2) and tube measuring slabs (Fig. 27.3) are available with the complete set (Fig. 27.4).

Several modifications have been attempted to prevent the migration of the tube. The Gladstone–Putterman modification (Fig. 27.5) of the Jones tube has a flange section in the middle, and is said to have less chance of dislocation [9]. Frosted glass Jones tubes and porous polyethylene-coated tubes have also been used to reduce the incidence of dislocated tubes [10, 11].

Fig. 27.1 Lester Jones tubes of various sizes

Fig. 27.2 The three gold dilators

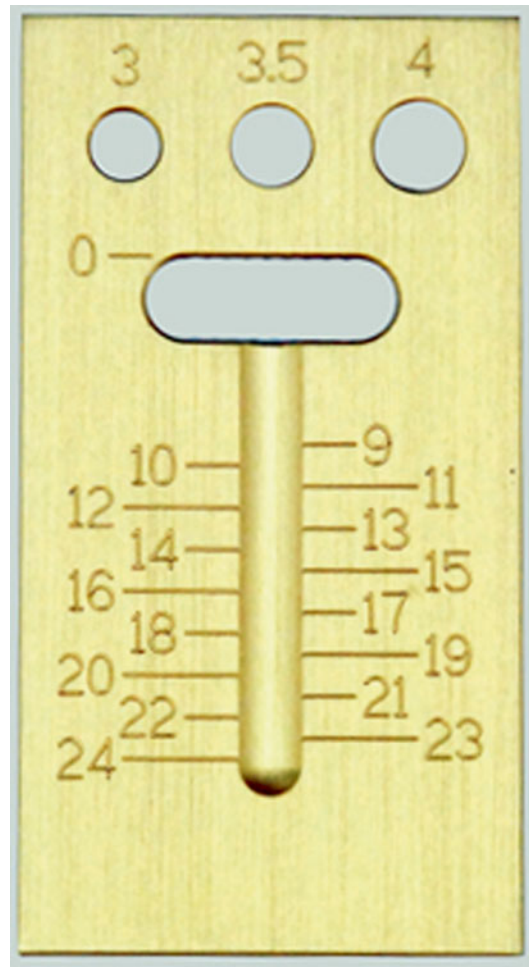

Fig. 27.3 Tube measuring scale

Fig. 27.4 A CDCR set

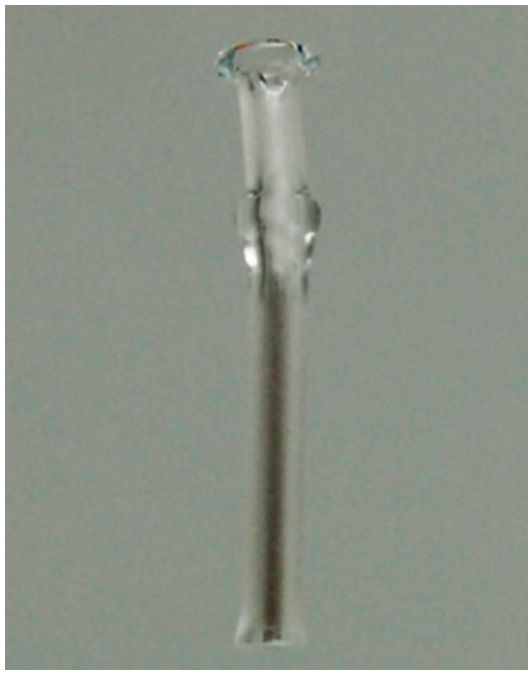

Fig. 27.5 Gladstone–Putterman's tube

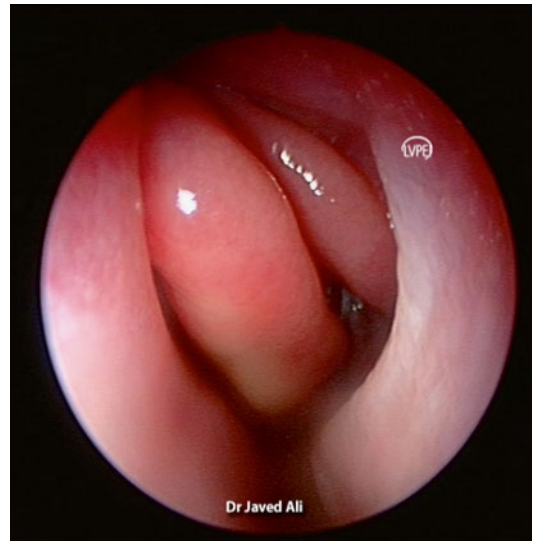

Fig. 27.6 Preoperative endoscopic examination of middle meatus

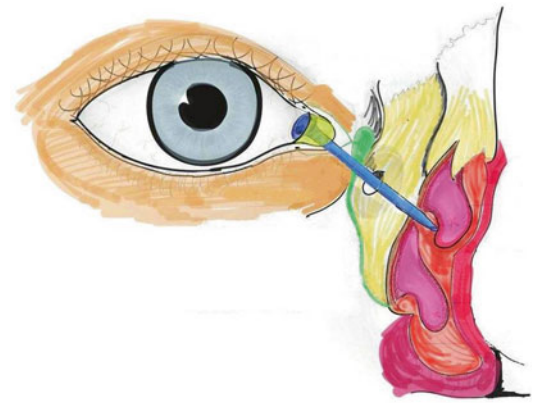

Fig. 27.7 Schematic diagram showing minimally invasive bypass tube placement without DCR. Note the head of middle turbinate obstructing the path of the tube (Photo courtesy: Himika Gupta)

Techniques

The nasal cavity of every patient must be inspected in the preoperative evaluation (Fig. 27.6). If a septoplasty for deviated nasal septum or a middle turbinectomy is required, they can be completed along with the CDCR procedure (Figs. 27.7 and 27.8).

The caruncle, medial canthal soft tissues may be anesthetized by deep infiltration with equal parts of 2 % lignocaine and adrenaline 1:200,000, and 0.5 % bupivacaine (Fig. 27.9). The nasal cavity is anesthetized by packing with a mixture of 4 % lignocaine and adrenaline, and submucosal injection of 2 % lignocaine with adrenaline (Fig. 27.10). Adrenaline is to be avoided in hypertensive patients.

Once the preparation is complete, the technique may vary. For external or endoscopic CDCR, regular DCR osteotomy is performed respectively, followed by creation of the lacrimal sac flaps. A portion of the caruncle is then excised followed by enlargement of the track from the conjunctival cul-de-sac to the middle meatus of the nose with the help of Wheeler of Von-Graefe's knife [4–6]. A Bowman's probe is introduced

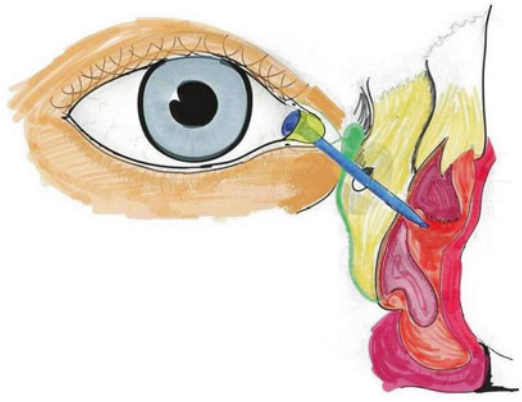

Fig. 27.8 Schematic diagram showing a partial middle turbinectomy (Photo courtesy: Himika Gupta)

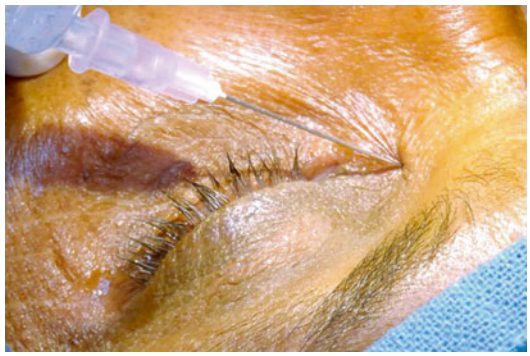

Fig. 27.9 Local anesthetic infiltration

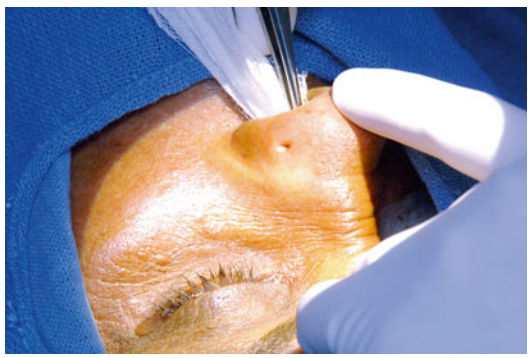

Fig. 27.10 Nasal decongestion with medicated packing

into the track and it is further enlarged with blunt dissection. The Bowman's probe is allowed to touch the septum and the length from the medial canthus to the tip is measured. Subtracting 2 mm

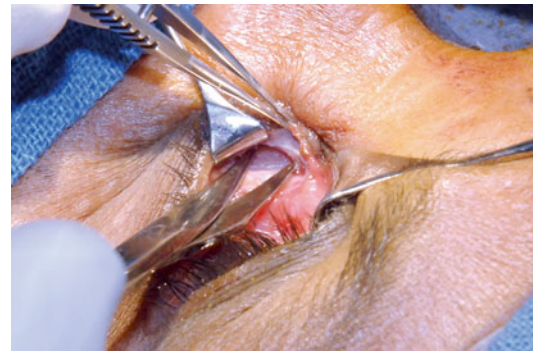

Fig. 27.11 Conjunctival incision and dissection

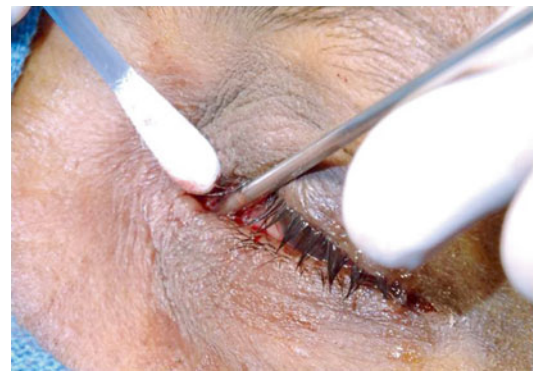

Fig. 27.12 The 14 gauge needle to create track for bypass tubes

from this measurement would give the length of Jones tube to be placed [5]. Jones tubes or bypass tubes of the surgeon's preference are then placed in the track under visualization to avoid touching the septum and secured at the medial canthus with 6-0 prolene. Tubes with a flange hole are preferred for ease of suturing.

For the minimally invasive placement of bypass tubes without a DCR (the author's preferred technique) [14], a 4-mm incision is given just below the caruncle and the tissues gently separated with a Wescott scissors (Fig. 27.11). A 14 gauge needle is then used through this track and directed inferomedially through the thin lacrimal bone into the middle meatus under endoscopic guidance (Fig. 27.12). A partial anterior middle turbinectomy is done where needed (Fig. 27.8). The ideal position of the needle in the nasal cavity is midway between the nasal septum and the lateral wall of

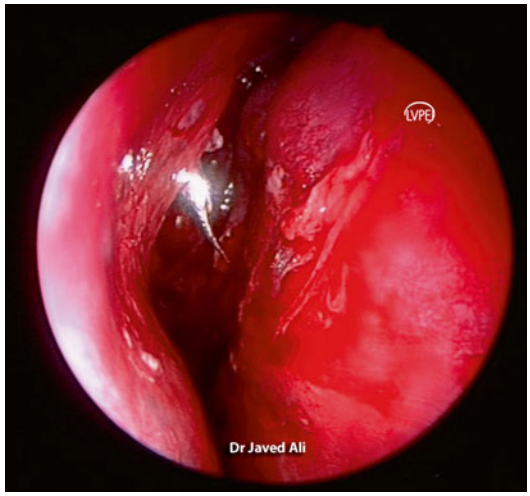

Fig. 27.13 Endoscopic view of the desired tube position being measured with the needle

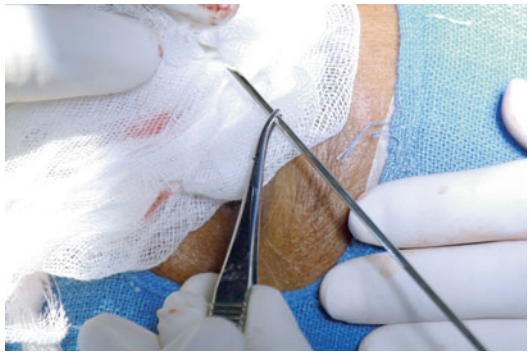

Fig. 27.14 Needle measurement for the Jones tube length

the nose (Fig. 27.13). Once this position is achieved, the caruncular end of the needle is grasped and the length of the needle measured (Fig. 27.14), which is correlated with the length of the Jones or Gladstone–Putterman tube (Gunther–Weiss company, Portland, Oregon) to be used. The track is dilated with gold dilators (Gunther–Weiss Company, Portland, Oregon) and the tube mounted on lacrimal probe steadily placed into the nasal cavity through the newly created track (Fig. 27.15). The nasal end of the ostium is not enlarged and this leads to a snugly fitted tube (Fig. 27.16). The tube is then secured with a 4-0 prolene at the caruncular end (Fig. 27.17).

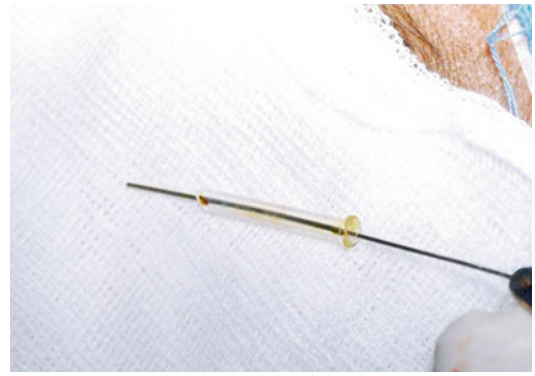

Fig. 27.15 Tube being mounted onto a Bowman's probe

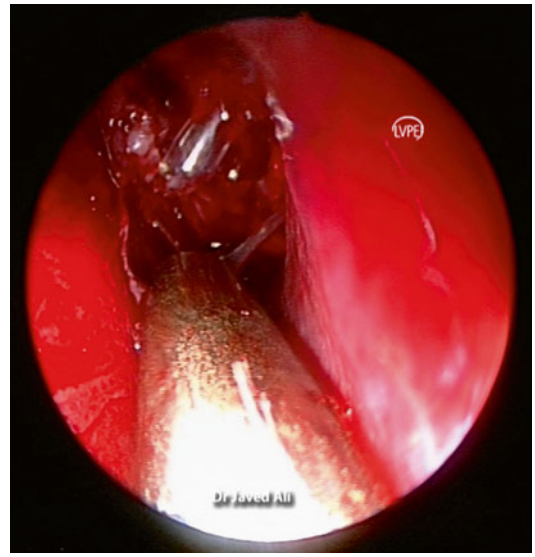

Fig. 27.16 Ideal tube placement. Note middle turbinectomy has already been performed

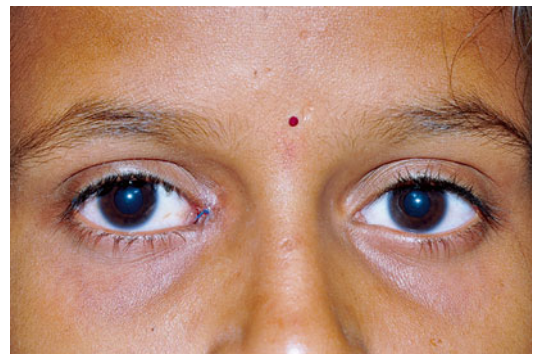

Fig. 27.17 Postoperative view of a patient with right bypass tube placement

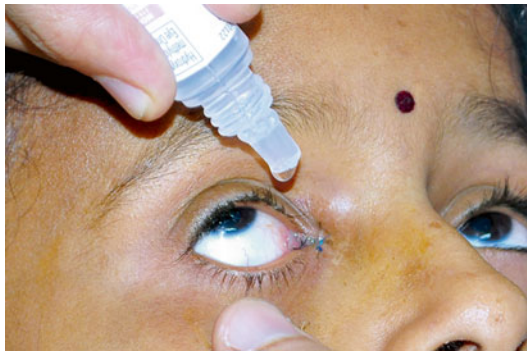

Fig. 27.18 Tube cleaning procedure: Introduction of few drops of nonviscous fluid or normal saline

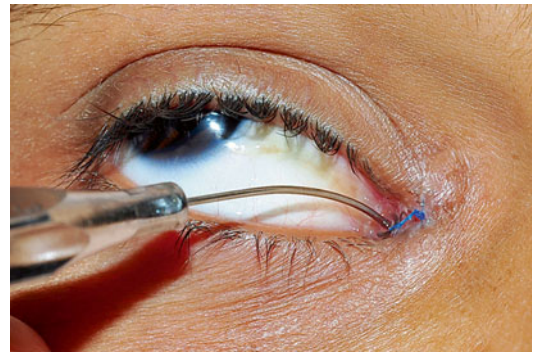

Fig. 27.20 Tube being irrigated to clear off the mucous plugs or debris

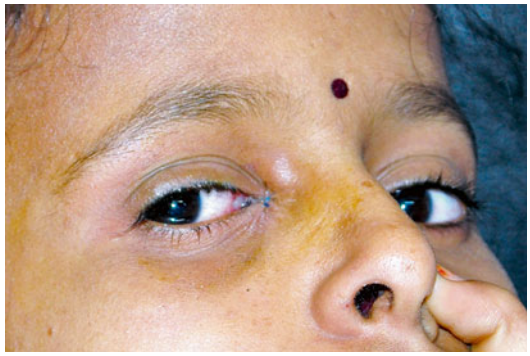

Fig. 27.19 Tube cleaning procedure: Drainage into the tube by negative pressure

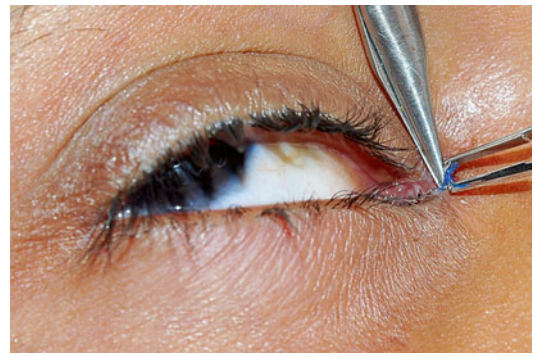

Fig. 27.21 Tube suture removal

The postoperative regimen includes topical antibiotics and steroids, nasal decongestants and steroids for a period of 3 weeks. The patients are trained to clean the tubes using negative pressure. Nonviscous lubricating drops or normal saline are placed in operated eye (Fig. 27.18). With the contralateral nostril closed, the patient gently sniffs, which creates a negative pressure in the nasal cavity and drains the cul-de-sac fluid into the nose (Fig. 27.19). The patients are postoperatively followed up on day 1, 1 week, 6 weeks, 3 months, quarterly for 1 year, and 6 monthly thereafter (Fig. 27.2c). At every visit, the class of lacrimal drainage is determined, followed by irrigation through the tube to clear the mucus or debris (Fig. 27.20). Suture removal is done at 6 weeks follow-up (Fig. 27.21).

Objective Assessment of Tube Functions: Drainage Classes

There are four categories to assess drainage [15]. A few drops of sterile water of nonviscous lubricant is placed in the conjunctival cul-de sac with the head tipped backward, and the drainage of the fluid toward the nasal cavity is assessed:

Class I drainage: Spontaneous fluid drainage.

Class II drainage: There is no spontaneous drainage but the fluid disappears on exaggerated nasal respiration.

Class III drainage: Fluid does not drain with respiration but the tube can be irrigated.

Class IV drainage: The tube cannot be irrigated.

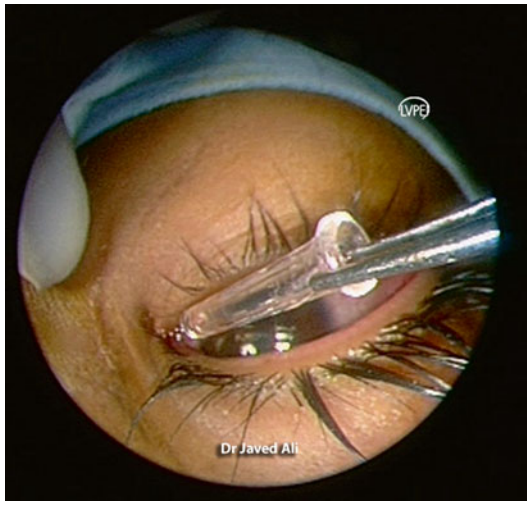

Fig. 27.22 Extrusion of inadequately sized and positioned tube

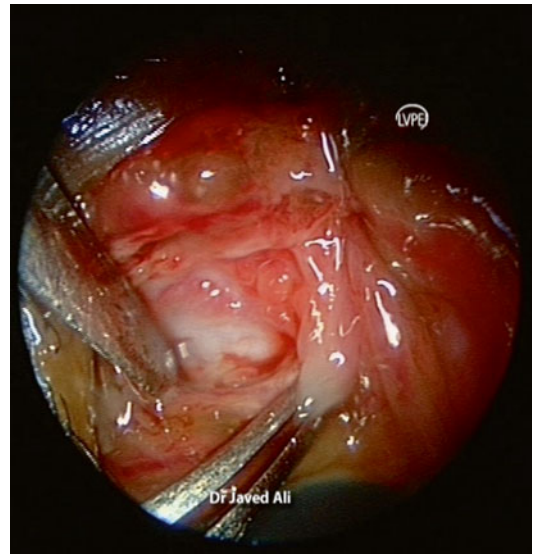

Fig. 27.24 Peritubal soft tissue infection

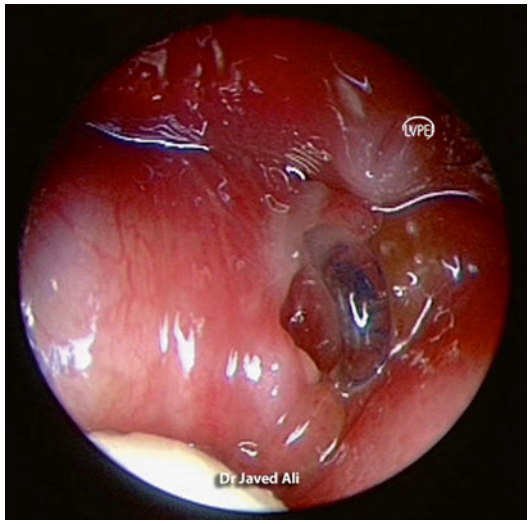

Fig. 27.23 Peritubal conjunctival granuloma

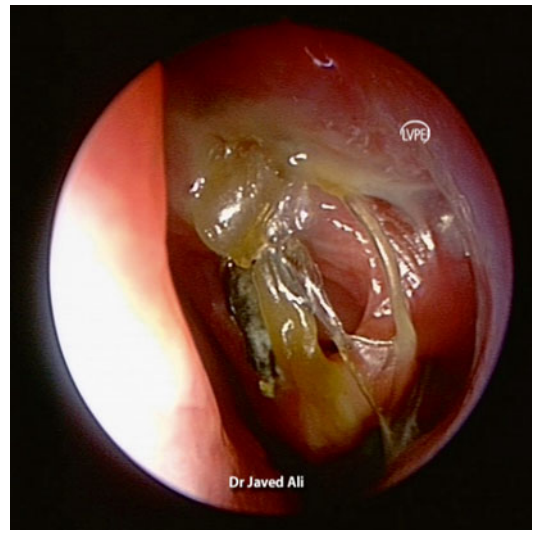

Fig. 27.25 Tube blocked by mucous plugs and discharge

Complications

1. Tube extrusion (Fig. 27.22)
2. Tube migration
3. Conjunctival granuloma (Fig. 27.23)
4. Peritubal soft tissue infections (Fig. 27.24)
5. Septum irritation
6. Tube blockage (Fig. 27.25)
7. Tube breakage (trauma)
8. Conjunctival pressure necrosis (Fig. 27.26)

Tube extrusion, malposition, or migration is the most common complication after surgery. These patients often need repositioning of the tube under endoscopic guidance, or even tube

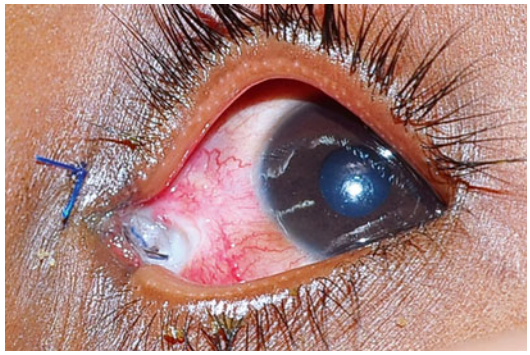

Fig. 27.26 Conjunctival pressure necrosis

replacement, some needing replacement more than once [16]. If a new tube is not inserted within days, the passage created may close. Occasionally in patients, complications, maintenance, and secondary procedures required may cause dissatisfaction even with a successful, functioning CDCR [17].

Outcomes

The overall outcomes of a CDCR are good but subsequent issues related to the tube are one of the main concerns for the surgeon. Stiensapir et al. [4] studied 79 eyes with CDCR and reported a success rate of 96 %; however, the extrusion rate was 51 %, tube malposition in 22 %, and tube obstructions in 23 %. Sekhar GC et al. [5] studied 69 eyes and reported 98.5 % of patients to be free of symptomatic epiphora; however, extrusion, malposition, and obstruction rates were 30, 28, and 28 %, respectively. In the largest study in the literature by Rose G et al. [6], 326 eyes were studied and an extrusion of 41 % was reported and the patient satisfactory outcomes were achieved in 91 %. Lee et al. [18] studied 124 eyes and reported a successful outcome in 97 % of patients and also found lower rates of extrusion (10 %); however, conjunctival overgrowth was noted in 12 % of their patients.

Choi and Yang [12] described an endoscopic guided transcaruncular Jones tube intubation without a DCR with a success rate of 91.4 %. They defined success as relief of epiphora along with patency of the tube to irrigation. Idiopathic canalicular obstruction was the commonest indication in their series (77 %) and the length of Jones tube varied from 16 to 30 mm. The significant point to note is dramatic reduction in tube extrusions (2.9 %). Although 22.9 % had inferior migration, majority of them were corrected in the clinic itself with good results. However, the time of suture removal was not specified and neither was the lacrimal drainage assessed objectively. Devoto MH et al. [13] published a similar technique which they termed "Minimally Invasive Conjunctivodacryocystorhinostomy" (MICDCR), using the Jones tubes with an average length of 16 mm. Notable feature of this series was that no case had any extrusion of the tube, although inferior migration was seen in 12.7 % of the patients, which were easily repositioned satisfactorily in all patients. Success in the Devoto series was based on demonstrating the aspiration of 2 % topical fluorescein into the nose with endoscopy. Ali MJ et al. studied 15 patients with endoscopically guided minimally invasive bypass tube placement without a DCR and found encouraging results with regard to extrusions. However, they reported other complications like peritubal soft tissue infection and conjunctival pressure necrosis [14].

In conclusion we state that endoscopic guided minimally invasive placement of a bypass tube without DCR is an easy and effective alternative to the traditional conjunctivodacryocystorhinostomy and is likely to help in avoiding major complications of tube extrusion and malpositions seen with the latter procedure. Objective evaluation of lacrimal drainage helps in typifying and uniformly assessing the outcomes in future.

References

1. Athansiov PA, Madge S, Kakizaki H, et al. A review of bypass tubes for proximal lacrimal drainage obstruction. Surv Ophthalmol. 2011;56:252–66.
2. Jones LT. The cure of epiphora due to canalicular disorders, trauma and surgical failures on the lacrimal passages. Trans Am Acad Ophthalmol Otolaryngol. 1962;66:506–24.

3. Jones LT. Conjunctivodacryocystorhinostomy. Am J Ophthalmol. 1965;59:773–83.
4. Steinsapir KD, Glstt HJ, Putterman AM. A 16-year study of Conjunctivodacryocystorhinostomy. Am J Ophthalmol. 1990;109:387–93.
5. Sekhar GC, Dortzbach RK, Gonnering RS, et al. Problems associated with Conjunctivodacryocystorhinostomy. Am J Ophthalmol. 1991;112:502–6.
6. Rose GE, Welham RN. Jones' lacrimal canalicular bypass tubes: twenty five years' experience. Eye. 1991;5:13–9.
7. Lim C, Martin P, Benger R, et al. Lacrimal canalicular bypass surgery with the Lester Jones tube. Am J Ophthalmol. 2004;137:101–8.
8. Mombaerts I, Colla B. Modified Jones lacrimal bypass surgery with an angled extended Jones tube. Ophthalmology. 2007;114:1403–8.
9. Gladstone GJ, Putterman AM. A modified glass tube for conjunctivodacryocystorhinostomy. Arch Ophthalmol. 1985;103:1229–30.
10. Wojno T. Experience with a Medpor-coated tears drain. Ophthal Plast Reconstr Surg. 2010;26:327–9.
11. Abdulhafez M, Elgazayerli E, Mansour T, et al. A new modification in the porous polyethylene coated Lester-Jones tube. Orbit. 2009;28:25–8.
12. Choi WC, Yang SW. Endoscopy guided transcaruncular Jones tube intubation without dacryocystorhinostomy. Jpn J Ophthalmol. 2006;50:141–6.
13. Devoto MH, Bernardini FP, Conciliis C. Minimally invasive conjunctivodacryocystorhinostomy with Jones tube. Ophthal Plast Reconstr Surg. 2006;22:253–5.
14. Ali MJ, Honavar SG, Naik MN. Endoscopically guided minimally invasive bypass tube intubation without DCR: evaluation of drainage and objective outcomes assessment. Minim Invasive Ther Allied Technol. 2013;22:104–9.
15. Gladstone GJ, Brazzo BG. Endoscopic conjunctivodacryocystorhinostomy. In: Cohen AJ, Mercandetti M, Brazzo BG, editors. The lacrimal system. New York: Springer; 2006. p. 180.
16. Zilelioglu G, Gündüz K. Conjunctivodacryocystorhin ostomy with Jones tube. A 10-year study. Doc Ophthalmol. 1996–1997;92(2):97–105.
17. Rosen N, Ashkenazi I, Rosner M. Patient dissatisfaction after functionally successful conjunctivodacryocystorhinostomy with Jones tube. Am J Ophthalmol. 1994;117(5):636–42.
18. Lee JS, Jung G, Lee JE, et al. The treatment of lacrimal apparatus obstruction with the use of an inner canthal Jones tube insertion via a transcaruncular route. Ophthalmic Surg Laser. 2001;32:48–54.